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FUNCTIONAL PROTEINS: CHAOS OR LOGOS

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ABSTRACT

The purpose of this paper is to explore whether undirected, randomized energy through physicochemical laws (Chaos) could make functional proteins necessary for cellular life. Both downhill and uphill work are explained. These two types of work are further explained as thermal entropy work and configurational entropy work. The four requirements for making a single functional protein of living systems are as follows: use of only left-handed amino acids, use of only peptide bonds, linking of amino acids in correct order, and prevention of other organic molecules joining the chain. Random methods (Chaos) violate all these requirements. Therefore, the correct three-dimensional structure of functional proteins cannot be developed by undirected physicochemical laws which do not perform configurational entropy work. It is clear that there needs to be an outside intelligent agent (Logos) to fulfill these requirements. An unbiased observer would have great difficulty denying the rationality of inferring from the complexity of functional proteins and a living cell the activity of a "Logos" which is the prime component of the creation model.

INTRODUCTION

Evolutionism and creationism disagree on how life began. Evolutionism claims all non-living and living matter can be explained only by natural causes, i.e., the laws of chemistry and physics. It claims these physicochemical laws explain not only how all things work, but how they came into being in the very first prebiotic soup of chemicals. These physicochemical laws operate solely by random methods (Chaos).

Creationism claims that although physicochemical laws are valid to explain how chemicals function today, they cannot explain how non-living complex chemicals and living cells and organisms originated in the first place. In order for matter and energy to organize itself into self-directing functional units, they must have a designed program with an uphill energy conversion system (configurational entropy work). This designed program with its uphill energy conversion system must be imposed on matter from an outside creative force (Logos). For example, the blueprint of an automobile is not contained within the steel, aluminum, chrome, and vinyl materials. There is no spontaneous urge for these materials to develop into engines, frames, bodies and interior by random methods (Chaos). The design and programmed operation of these components were ordered by automotive engineers and skilled craftsmen (Logos). Likewise in the first living cell, the basic unit of living structure, i.e., a functional protein, must be developed. If functional proteins can be developed solely by physicochemical forces acting randomly (Chaos), then evolutionism could be a true explanation of life. But if a simple flow of energy through a system of matter cannot organize chemicals into a functional protein, then evolutionism could not explain the origin of life. If it can be shown that to organize amino acids into a functional protein a selecting, sorting, and sequencing program with an uphill energy system is required, then the creation model which includes a creative force (Logos) would be the logical explanation for the origin of life. It is the purpose of this paper to explore whether undirected, randomized energy through physicochemical laws (Chaos) can make even one functional protein. It will discuss the two types of thermodynamic work and how physicochemical forces (Chaos) fail to perform configurational entropy work. It will show how the Logos of the creation model must be required to originate and make functional proteins.

Easterbrook (1) stated: "nobody has any idea what makes chemicals start living. The origin of life is perhaps the leading unknown of contemporary science." Wickramasinghe (2) bluntly observed: "One is inevitably faced here with a situation where there are few empirical facts of direct relevance and perhaps no facts relating to the actual transition from organic material to material that can even remotely be described as living." These quotes demonstrate the immense problems associated with explaining how chemicals organize themselves into living entities. The question this paper will try to answer is "how, when no life existed, did functional proteins, the building blocks of DNA and organelles, come into existence which today are absolutely essential to living systems yet which can only be formed by those systems."

Downhill and Uphill Work

The cell is a living factory; proteins are the chemical machines that carry out the directed work. To originate life, DNA and protein, which are not living, must be synthesized. Understanding how they are synthesized involves the Second Law of Thermodynamics. Bradley (3) explained the application of this Law as follows:

The Second Law of Thermodynamics tells us which processes tend to happen spontaneously in nature. Processes that involve a loss of energy occur spontaneously; processes that involve an increase of energy don't. Hot water cools down spontaneously because that involves a loss of kinetic energy in the molecules. Cold water doesn't naturally heat up because that involves an increase in energy. That's why we have water heaters in our homes - to achieve something that doesn't happen naturally.

Spontaneous processes are sometimes called "downhill" processes. That's because they are illustrated by things that go downhill - balls or wagons or waterfalls. Take a ball to the top of a hill and let it go. What happens? It rolls down. Take the same ball to the bottom of the hill and let go. Does it roll up? No. Why the difference? The first represents a loss of energy. A ball perched on the top of a hill is full of potential energy, which is lost on the way down. That's why rolling downhill happens spontaneously. Rolling uphill, on the other hand, requires an increase of energy. That's why we have to kick the ball, or a strong wind might come along and push it, or whatever. To get the ball uphill takes an input of energy from outside, what we call "work."

Thermal Entropy and Configurational Entropy Work

The building blocks of proteins are amino acids. They are easy to make in the laboratory, because they involve only downhill reactions. Achieving a downhill chemical reaction to occur is no greater event than getting a ball to roll downhill.

However, producing a functional protein is an extremely difficult process. Proteins synthesize when several hundred amino acids react to join into a chain. They have to be forced together by outside energy (uphill).

To push forward a thermodynamically unfavorable reaction - an uphill process - we need to apply work to the system. Thermodynamically there are two kinds of work: thermal entropy work and configurational entropy work. Entropy is "a statistical concept that measures the number of ways a system can be arranged" (4).

Bradley (5) explained these two forms of work as follows:

Thermal entropy is a measure of the way energy is arranged. The difference between a hot cup of water and a cold one is that the hot water has more energy. Its molecules are moving around faster. To produce hot water, we have to do thermal entropy work. The other kind of entropy is configurational entropy: that's a measure of the way mass is arranged. The difference between a pretzel and a bread stick has nothing to do with energy - it has to do with their shape, their configuration. To produce a pretzel shape, we have to do configurational entropy work.

Requirement of a Functional Protein

To synthesize a functional protein, one kind of work is needed to make the parts join together; another kind to make sure the parts are in the correct sequence in order to yield a specific chemical structure. Evolutionary theories on the origin of life fail to make this distinction. They go on the assumption that we only need to locate an energy source to drive forward a reaction and make the amino acids join together then we have solved the problem of synthesizing a functional protein. Evolutionary theory relies on only thermal entropy work. Simple application of thermal entropy work merely causes amino acids to join together and form a random chain. But to synthesize a functional protein, the second type of work, configurational entropy work, must also be applied. A chain of amino acids hooked up by random methods is not a functional protein.

There are four requirements for making a functional protein and not just a random chain of amino acids.

1. Living systems use only amino acids that bend light to the left, called left-handed amino acids. The problem is that when chemicals are mixed in the laboratory, the result is always a relative 50-50 mix of left-and right-handed amino acids.
2. Amino acids must be connected only by peptide bonds and no other chemical bonds. The problem is that using random lab methods results in approximately 50% peptide bonds.
3. The amino acids must be linked together in exactly the correct order. The problem is that random methods of linking produce a non-functional random order.
4. Any organic molecules floating around in the environment must be kept from joining the amino acid chain. The problem is that there are about 100 different amino acids bumping around in any prebiotic soup, but only 20 are used in living cells. Random methods promote the mixing of the non-vital amino acids with the 20 required vital amino acids.

Imposing these four requirements on a protein chain is configurational entropy work. What is needed is a selecting, sorting, and sequencing program supplied by some creative force (Logos). The creation model claims this creative force is an intelligent agent which is the Supreme Being and Creator, the Triune God of the Bible.

Biological function of proteins requires a three - dimensional morphology which depends on acquiring only left - handed amino acids, only peptide bonds, correct sequences and avoidance of all other organic molecules. Physicochemical laws (Chaos) do not meet any of these requirements. Therefore, the correct three-dimensional structure cannot develop by undirected physicochemical laws, and the resulting chemical won't have any biological function. The argument here for the origin of functional proteins is between natural forces (Chaos) and an intelligent agent (Logos).

Chaos or Logos?

Denton (6) has commented: "No evolutionary biologist has ever produced any quantitative proof that the designs of nature are in fact within the reach of chance." He further stated (7): "There is simply no way of explaining how a uniform rate of evolution could have occurred in any family of homologous proteins by either chance or selection; and, even if we could advance an explanation for any particular protein family, we would still be left with the mystifying problem of explaining why other protein families should have evolved at different rates."

Crick (8), alluding to the need for a divine intelligence to originate life, stated: "An honest man, armed with all the knowledge available to us now, could only state that in some sense, the origin of life appears at the moment to be almost a miracle, so many are the conditions which would have had to have been satisfied to get it going."

All the problems of requiring both thermal entropy work and configurational entropy work for synthesizing a functional protein apply to DNA - only more so, because DNA is many times more complex. And even the simplest living system is much more than functional proteins or DNA molecules. The synthesizing of functional proteins or DNA is still a very small step in the development of a living system.

Evolutionism argues that given enough time, the impossible becomes not only possible, but inevitable. Yet, Blum (9) points out that long time spans work the opposite. The longer the time span for a reversible synthesis to occur, the more likely the reverse reaction

(decomposition) occurs. Blum (9) stated: "the greater the time elapsed, the greater should be the approach to equilibrium, the most probable state, and it seems that this ought to take precedence in our thinking over the idea that time provides the possibility for the occurrence of the highly improbable."

Anderson (10) commented on the gap between the first simple organic molecules and a complete reproducing cell:

While much attention and effort has focused on the prebiotic formation of such molecules as amino and nucleic acids, the formation of a reproducing cellular entity in a prebiotic environment constitutes a gap seldom addressed in the scientific literature. Indeed, the gap between simple organic molecules and a reproducing cell is vastly greater than that envisioned by most researchers in origin of life studies. The nature and complexity of known cells suggests that the simplest conceivable cellular form is far too complex to be a product of known prebiotic mechanisms. From directing metabolic processes to maintaining osmotic stasis, all would be necessary functions for the first cell.

Wilder-Smith (11) commented on the basis of all biology: "Thus the basis of all biology is codified information, i.e., stored or crystallized Logos. Thus modern coded molecular biology requires a thinking, concept forming, instruction giving Logos (i.e., a Logos full of ideas) as basis. Chaos (chance) imparts no simulated, coded instructions - and develops no ideas."

CONCLUSION

How did the first and subsequent functional proteins originate? The contrast is between natural forces (Chaos) and an intelligent agent (Logos). The essence of intelligence is precisely the ability to select and direct processes. The evidence presented is that a "Logos" is necessary for the origin of functional proteins, DNA, and living systems. Of course, this "Logos" is not a human being but a Divine Designer. An unbiased observer would have great difficulty denying the rationality of inferring from the complexity of living cells the activity of a "Logos."

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